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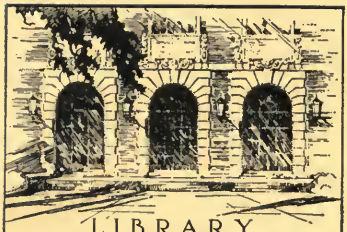

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A SPECIMEN OF ELASMOSAURUS SERPENTINUS

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A specimen of *Elasmosaurus serpentinus* on exhibition in Field Museum was collected many years ago from the Fort Benton Cretaceous of southeastern Montana. This specimen was figured from a photograph by Professor Williston in his *Water Reptiles of the Past* (University of Chicago Press, 1914) but no description of it was ever published. Since the specimen in question shows the structure of the pectoral and pelvic girdles more completely than any so far described, it appears desirable to give a detailed description of it.

The specimen, Field Museum No. 12009, consists of sixty or more vertebrae, both scapulae and both coracoids, the left paddle almost entire, the left pubis, and both ischia and ilia. The specimen was found weathering out at the surface of a gentle slope of Benton Cretaceous shale and no part of it extended more than sixteen inches below the surface (fig. 112). The vertebrae were disarticulated and more or less displaced; the arches and processes were also displaced and intermingled with the mass of ribs, in the matrix. The centra were split and scattered so that no individual vertebra has been reconstructed. From the condition of the specimen it is impossible to distinguish the position or exact number of the vertebrae in the column.

The bones of the pectoral and pelvic girdles, as shown in figure 111, were closely associated. The left paddle had all the bones articulated and in position; when the specimen was collected great care was taken to keep the arrangement intact.

The *scapula* is intermediate in outline between that of *E. platyurus* Cope and that of *Trinacromerum* as figured by Williston (op. cit.). There is nothing to indicate that it met its fellow in the median line as indicated in Cope's species. The scapula is fairly broad at the proximal articulation, moderately constricted

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at a point one-third the length of the bone above the proximal articulation and broadly expanded at the distal end. The superior margin of the scapula is somewhat thickened in the antero-mesial half for cartilaginous attachment. The postero-lateral angle of the distal end is thickened to form a stout tuberosity.

The *coracoid bones* meet at the median line in a symphysis, strongly thickened at the middle. The outline of the two bones shows a heart-like interspace posterior to the symphysis. The posterior half of each coracoid bone is made up of an expanded process similar in outline to the distal end of the scapula in the sauropod dinosaurs. The posterior margin is thickest at the postero-lateral angle but the attachment for cartilage extends around to the postero-mesial angle. The lateral margin is broadly concave. The facets for articulation of the scapula and of the humerus meet at the middle of the articular surface in an obtuse angle. The entire structure of this pair of bones is quite unlike that of *E. platyurus*, as figured.

The *pubis* is a well-rounded bone, somewhat broader than it is long. In the single bone preserved in this specimen, the anterior margin is broken away throughout its greater extent and has been restored according to the general form of the bone. The pubis presents to the ischium a surface for cartilaginous attachment quite as broad as the surface presented for articulation with the femur.

The right and left *ischia* meet at the middle line in a thickened, but rather short, ischiatic symphysis. The posterior third of the median outline of each curves away from the middle line, leaving a narrow emarginate angle. At the middle of its length, the ischium is moderately constricted and again expands at the proximal end for the articular surface. The surface presented to the pubis meets that of the acetabulum in a well-rounded angle.

The *ilium* is much the smaller of the pelvic bones and tapers from the proximal articulation to the distal end in a wedge-like manner. The distal end terminates in a small, rugose extremity.

The *left paddle* has been carefully handled so as to retain the bones of the carpus, metacarpus, and phalanges in their relative positions. Only a few of the smaller phalanges are missing from the distal end of digits 2, 3, 4, and 5. The humerus is a strong, flat bone having its distal end nearly twice as broad as the proximal one. The shaft is but little constricted at the middle. The facet for articulation with the radius is much broader and stronger than

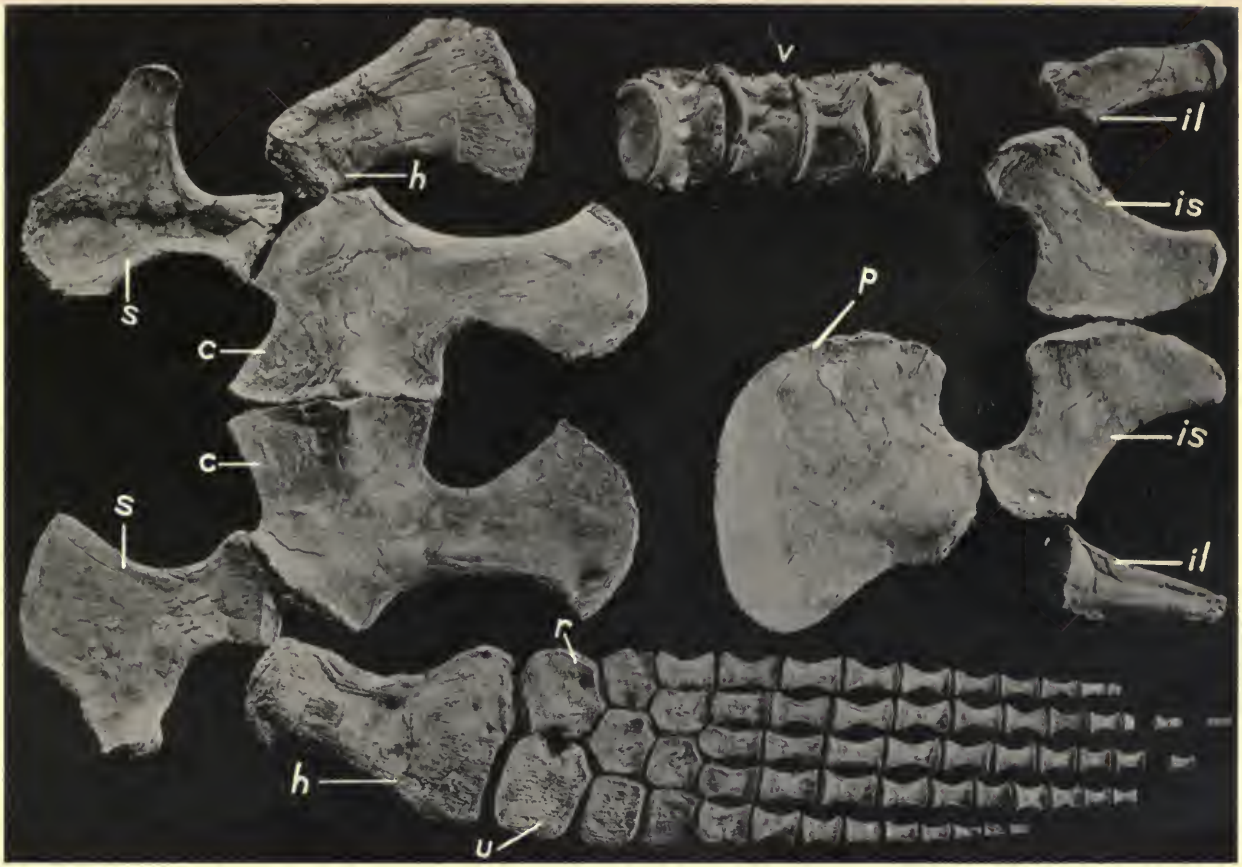

FIG. 111. *Elasmosaurus serpentinus* Cope, F.M. No. 12009. *c,c*, coracoid bones; *s,s*, scapulae; *h,h*, humeri; *r*, radius; *u*, ulna; *p*, pubis; *is, is*, ischia; *il, il*, ilia.

that for the ulna. The two facets join each other at the posterior margin in an obtuse angle.

The *ulna* and *radius* are rounded and flattened bones with dis-

FIG. 112. Excavation in Benton Cretaceous near Alzada, Montana, showing specimen of *Elasmosaurus serpentinus*, F.M. No. 12009, with associated gastroliths as found.

tinct emarginations on the surfaces presented to each other. The radius is appreciably thicker and stronger than the ulna.

The *carpus* consists of three bones in the proximal row and three in the distal row; the distal end of the ulna articulates almost

equally with the ulnare and the intermediate. The distal facet of the radius, articulating with the radiale, is twice as broad as the facet for the centrale.

The proximal series of *metacarpals* diminish somewhat in size from the radiale to the ulnare. The bones of the distal series are likewise somewhat smaller than those of the proximal series. The bones of the metacarpal series are but little different in structure from the phalanges which articulate with them. The differences consist of somewhat more massive structure and a slight convexity of the proximal, articular end which, in the second and third meta-

FIG. 113. Series of 206 gastroliths found in association with specimen of *Elasmosaurus serpentinus*. These gastroliths vary in size from 20 to 102 millimeters in diameter.

carpals, is replaced by a marked angulation. The fourth is but little constricted in the shaft, the fifth more so. The distal ends of the five metacarpals are truncated and similar in structure to the corresponding articular surfaces of the larger phalanges.

The *phalanges* of the first digit are fewer in number, and taper more rapidly from the proximal to the distal end of the series than is true of the succeeding digits. Seven phalanges of this digit are preserved, the size of the last indicating that two or three small bones may have been lost from this digit. The phalanges of the second digit hold their size more uniformly from first to last. Eight phalanges are preserved in this digit with a possible three or four small ones missing from the distal end of the series. The phalanges of the third digit are even less tapering than those of the second. Ten of the series are preserved, with a probable three or four missing. The phalanges of the fourth digit are similar to those of the third in strength and in proportion. Ten of these bones are preserved, with a probable three or four missing. The phalanges of the fifth digit taper more rapidly toward the distal end of the series than those of the third and fourth. Nine phalanges are present, probably two or three are missing.

Associated with the pectoral girdle of this specimen were 206 gastroliths of granite pebbles (fig. 113). These pebbles were scattered about the coracoid bones and the anterior parts of the paddle, several of them overlying the bones and indented into them. The pebbles are rounded and smooth, but in no case do they have a high polish. They vary in extreme measurement from 20 to 102 millimeters; the largest, which is more than twice the size of any other in this lot, weighs 417.5 grams.

MEASUREMENTS

(*In millimeters*)

PECTORAL GIRDLE	
Left scapula	
Length	370
Breadth from anterior angle to posterior process	364
Breadth across proximal articular surface	172
Left coracoid bone	
Length, anterior angle of articular surface to posterior margin	520
Length of mesial articular surface	291
Greatest breadth at anterior third	320
Breadth at distal end	280
Breadth at constriction	125
PELVIC GIRDLE	
Pubis	
Antero-posterior breadth (estimated)	368
Greatest oblique diameter	427
Ischium	
Left, greatest length	168
Greatest breadth at anterior end of symphysis	180
Length of ischiatic symphysis	116
Ilium	
Greatest length	170
Breadth of distal tubercle	48
PADDLE	
Humerus	
Greatest length	307
Breadth at proximal end	153
Breadth at distal end	247
Ulna	
Greatest antero-posterior diameter	121
Greatest lateral diameter	122
Radius	
Greatest antero-posterior diameter	123
Greatest lateral diameter	141
Radiale	
Length	78
Breadth	97
Centrale	
Length	97
Breadth	90
Ulna	
Length	79
Breadth	84
Length of digits	
First digit, 9 phalanges	390
Second digit, 9 proximal phalanges	485
Third digit, 8 proximal phalanges	500
Fourth digit, 9 phalanges	565
Fifth digit, 9 phalanges	545
Vertebral centra	
Shortest centrum	88
Breadth of centrum	142

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